COLONY OF THE GAMBIA.

IMPERIAL MYCOLOGICAL
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INSTITUTE

THE REPORT

OF THE

DEPARTMENT OF AGRICULTURE

FOR THE YEAR ENDING 31ST MAY, 1937.

Price 2/-

BATHURST :
PRINTED BY THE GOVERNMENT PRINTER

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The Report of the Department of Agriculture for the period ending 31st May, 1937.

SECTION 1. AGRICULTURE IN THE COLONY AND PROTECTORATE.

A. Meteorology.

1. Rains generally commenced early in May 1936 but were heavier in the middle and upper river. Throughout the season the rain continued satisfactorily and in all cases averages were above normal. A month after the normal end of the rains a storm was experienced throughout the country on the 25th November which was heaviest in the lower river. The following season (1937) rains had not commenced by the end of May though one storm occurred in the Upper River in April which is unusual.

2. Rainfall records of five stations are given below. Bathurst and Cape St. Mary (coast stations), Kerewan (lower middle river), Yoroberi-kunda (middle river) and Wuli (upper river).

1936.	Bathurst.	Cape St. Mary.	Kerewan.	Yoroberi-kunda.	Wuli.
June	2·79	4·08	6·53	4·01	10·15
July	11·41	11·70	10·62	7·44	7·64
August	28·95	25·39	24·68	19·56	24·23
September	19·95	12·37	11·76	7·43	9·76
October	3·09	2·71	3·55	5·19	5·30
November	0·61	0·67	1·07	0·21	0·10
December	—	—	—	—	—
1937.					
April	—	—	—	—	0·40
May	—	—	—	—	—
Total :—	66·80	56·92	58·21	43·84	57·58

3. Temperatures are available only for the following stations :—

1936. Months.	Bathurst Means.		Cape St. Mary Means.		Yoroberi-Kunda Means.		Wuli Means.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
June	86·9	73·3	88·6	75·2	95·4	74·8	95·2	65·8
July	85·6	72·6	85·2	64·0	87·8	71·8	89·0	74·3
August	84·2	70·6	84·7	73·3	85·2	70·4	86·6	73·4
September	85·5	70·9	87·0	78·7	86·9	71·2	87·6	73·6
October	87·6	73·2	96·0	73·4	92·6	74·1	91·6	74·7
November	86·2	70·1	87·3	70·8	91·7	64·2	91·0	67·7
December	84·5	65·9	87·2	66·6	91·2	59·8	93·0	58·9
1937.								
January	83·1	62·3	85·8	63·1	92·1	58·7	93·6	56·4
February	86·1	62·1	88·5	65·8	99.3	59·9	100·3	56·8
March	82·3	65·9	86·6	62·8	102·6	66·4	103	69
April	80·5	64·9	82·2	59·8	103·5	70·3	104·3	72·9
May	84·0	67·7	89·1	62·7	102·3	73·3	103·7	76·5

B. Agricultural Crops.

(*a*) *Export Crops.*

4. *Groundnuts.*—A larger area than in the previous season was planted up and with good rains during the early part of the season the crop germinated and grew satisfactorily. The heavy rains of August and September however caused excessively moist conditions and as a result much defoliation through Cercospora personata took place in the earlier sowings. This opened up the plants to infection with rosette which rapidly spread to late sowings. In consequence when harvested there were amounts above normal of immature nuts showing an excess of shell on analysis. Prices at the beginning of the trade season were good, marketing proceeded rapidly and competition was brisk. During inspection at ports in the river several quantities of volunteer nuts (crop from nuts left in the ground from the previous season) were being offered for sale and purchased. These nuts are usually dug some fortnight or three weeks before harvesting the main crop, ostensibly for purposes of food. In actual fact much of this passes into the hands of Julamen to meet debts, and in view of the fact that the rains are still on they generally become sweated and mouldy in storage. The Julaman has no other use for them but sale to export firms, and where it is obvious they are bad, admixture with good is usual so as to deceive the buyer. Cases were met with where 50 to 60 per cent of the nuts were bad and the attention of the Chiefs was brought to this evil. The local buyers, though warned by their firms and by Agricultural officers of the bad nuts within their purchasing area, are in a difficult position as, if the nuts are obviously bad and they refuse to buy either the seller goes to a less scrupulous buyer or adulterates as mentioned above till the percentage bad is less obvious. In the height of the trade season it is neither practicable nor possible for the trader to inspect each bag carefully. The farmer says the volunteer nuts, if left in the ground till the main harvesting season, will go bad. This however was not the case with volunteer nuts on the agricultural farm at Yoroberi-kunda where the percentage bad was below 1·0 per cent as against the main crop on the farm of 0·2 per cent and where the former were dug after the main harvesting season. It would appear that pressure of creditors rather than food is the reason for earlier digging of volunteer nuts and the evil of these nuts coming on to the market is under consideration. It appears that action against the responsible farmers is desirable. The setting of one harvesting date for all nuts would probably reduce the percentage bad. Foreign matter in the way of plant stem refuse is also higher than necessary and can be reduced by more careful winnowing by the farmer.

5. *Palm Kernels.*—These are the product of the wild palms situated chiefly in the lower river where the more humid conditions exist.

A good deal of the trade is in the hands of the palm wine tappers and it would appear that the wine is to most of the tappers the most important product. Instruction has been given in many places in the better preparation of the palm kernels for market. There is usually too much shell left adhering to the kernels and in many cases this is due to far too short a period between harvest and breaking.

An effort was made to get the people in the middle river, where a few palm belts occur, to take an interest in this crop and at least one firm offered a fair price as encouragement. It is to be regretted however that the people did not respond, considering the work was too hard in relation to value offered. In one particular case, visited frequently, the individuals who exploited the palm were wine tappers They harvested what nuts there were, obtained the oil and ignored the kernels.

It may be that in years of good groundnut prices they receive all the cash they desire or find necessary for their needs without recourse to other products. Sales of palm kernels fluctuate according to value; a low price means the crop receives less attention.

6. *Beeswax.*—The fluctuations in the exports of this product have been very wide, and a survey of the last six years indicates very clearly that price has not influenced sales. On the other hand the amount of cash coming into the country for groundnut sales shows a definite negative correlation with the quantity of wax on offer. The local values of wax have been between 1¼d to 1½d per lb. of rough wax over the period. More recently (1937) it was raised to 2d. If it is considered that rough wax produces 25 per cent clean wax then roughly the value the producer is receiving is equal to £47, £56, and later £75 per ton respectively. The clarification is done by the firms and the cost of this must be added together with other charges to arrive at f.o.b. values. On data available, 1934, when the price was 1¼d. per lb. rough wax, the f.o.b. value was £53 which leaves after deducting cost (£47) £6 for clarification, packing, etc. In 1934 the Agricultural Department prepared and in 1935 sent to England a small quantity (12 cwt.) of clean wax which obtained a price of £5 per cwt. or £100 per ton. The f.o.b. value of beeswax was approximately £54 that year, a difference of £46 per ton. As there was nothing exceptional in the quality of that prepared by the Agricultural Department, in fact it was not in any way superior to that exported by the firms, it is reasonable to suppose a similar English market price was obtained by the latter. It appears reasonable to consider a better local price is possible which might cause the industry to be independent of other crop or cash factors. When the season opened in early 1937 one firm offered a value of 6d. per lb. for clean wax and though some of this has been prepared and sold by the people the tendency is to sell the rough wax which receives 2d. per lb. as better value.

(*b*) *Food Crops.*

7. *General.*—Food crops on the whole had a satisfactory season and further distributions of cassava cuttings by the Department have been necessary to meet local demands. With regard to rice a Hill Paddy introduced in 1931 was distributed in Fulladu West and gave very satisfactory results. Demands for seed of this and Guiana Creole have been heavy for 1937 season and these have been met as far as stocks would allow. The former rice in addition to showing a satisfactory yield has appealed to the people in view of its comparative freedom from bird attack. It possesses a very long stiff awn.

C. Livestock.

8. *Rinderpest Immunization.*—Dr. G. N. Hall, Veterinary Pathologist, was present in the Protectorate from November 1936, to May 1937.

Over 11,000 head of cattle were immunized in the Upper River Province.

The scheme has definitely got a very strong hold of the people particularly in the MacCarthy Island and Upper River Provinces. Inoculations carried out in 1935–36 dries have stood up to tests in MacCarthy Island Province. Many of the immunized cattle have been in close contact with rinderpest outbreaks and no deaths of these animals have taken place, nor symptoms of the disease in them been reported. The scheme has had its effects on the meat market and butchers are having the greatest difficulty in obtaining animals. Offers by the Department of up to £10 an animal have been refused. This is more than double the value prior to the immunization scheme.

Several herds have noticeably increased as a result and purchases from French Territory have taken place to augment the herds.

What the owner will consider the limit of his stock before he will sell cannot be ascertained at present.

9. *Hides and Skins Improvement Scheme.*—This has been extended during the year and at the end of the period covered by this report seven markets will be under the scheme.

Prices have been chiefly in the neighbourhood of 5d per lb. for properly flayed and dried hides.

In Bathurst the firms are now purchasing the hides and drying them after the arsenical treatment.

10. *Clarified Butterfat.*—A sample prepared during the year by Mr. L. H. Saunders was forwarded to the Imperial Institute for report, of which the following is an extract :—

> " The results of the examination show that the moisture content (0·6 per cent) is higher than is desirable as in order to ensure that ghee will keep in sound condition the amount of moisture should be below 0·2 per cent. The constants of the moisture-free fat indicate however that the ghee is of normal composition, and are similar to those obtained for the samples from Nigeria previously examined at the Imperial Institute. The slight differences that exist are not significant, being merely such as might be expected from butter fats produced in different countries.
>
> " The ghee, together with particulars as to the mode of preparation was submitted to Messrs. Lever Brothers, Ltd., who, through their associated company the United Africa Company, Ltd., are already purchasing consignments of ghee from Nigeria. They reported as follows :—
>
> > " The United Africa Company would anticipate no difficulty in dealing also with ghee from the Gambia, provided that the price and the quality are satisfactory. The analytical data on the present sample show that it is very good average sample of West African ghee, but we find it necessary to exercise caution, in that, apparently the quality varies considerably according to season. This applies especially to such important factors as the Reichert-Meissl value, which is highest when the cattle obtain the young pasture at the beginning of the rains, and from then tends to fall away as the dry season approaches and the grass becomes hard and less nutritious. The moisture content is a matter of some importance for the proper keeping of ghee intended for the export market, and if the method of preparation is carried out properly there should be no difficulty in keeping the moisture content down to the figure between 0·1 and 0·2 per cent.
>
> " The present sample of ghee from the Gambia is of promising quality, and consignments of similar ghee, if offered with a moisture content below 0·2 per cent and free from rancidity, should find a ready market in the United Kingdom ".

A survey of the Upper River Province was undertaken by Mr. Saunders during 1936 in connection with the possibilities of butterfat. Several herds were visited and out of a total of nearly a 1,000 head approximately 27 per cent were cows in milk. With regard to marketing of native butter he reports as follows :—

> " There is little or no market either for ' Curd Butter ' or the ' Butter ' locally. Sometimes it is exchanged for corn and other foodstuffs ".

In the Fulladu West District investigations show that there is a good deal of butter prepared and consumed. The position is that when the cattle have been brought down to their owners' homes for manuring the land, the milk, cream or butter is chiefly consumed within their own circle or village. The amounts available not being sufficient, sale of the products is not generally undertaken unless cash or food is desired by the owner. Cash sales to surrounding inhabitants are few owing to their lack of cash and generally are in the form of barter. Such lack of cash is undoubtedly due to the evil of credit at crippling high rates of redemption. Villages where there are no cattle therefore have great difficulty in

getting these products. An unfortunate custom that decrees that only elders should have the cream or butter seems to prevail. Children and youths at a stage in life when the best is most desirable, seldom if ever get anything else but the skimmed milk, and that seldom. When the herds return to their wet season areas away from the river the product is used by the herdsmen, who do not farm, in exchange for food and other necessities. The period when the cattle are in wet season areas varies according to the rains and may be only two or three months.

D. Insect Pests and Diseases.

11. *Locusts.*—Both large and small swarms appeared during June and July, 1936, in North and South Bank Provinces while in the latter month hoppers were observed in South Bank and MacCarthy Island Provinces. Measures were taken against them and no damage to crops was reported. During the following ten months the country was apparently free of the pest.

12. *Aphis spp.*—Reports were received that "Leo" caused by an *Aphis sp.* was fairly prevalent. It chiefly attacks guinea corn.

13. *Ceropids.*—These were reported from South Bank Province on rice and some damage done. They appear to be prevalent only at certain times and generally attack the young plants.

14. *Other Pests.*—Damage by caterpillars to guinea corn in the Kantora District of Upper River Province was reported. It appears that it is encountered chiefly on farms where a period of drought occurs after the rains have broken. When the heavy rains commence it disappears.

15. *Cercospora Personata and Rosette.*—These have already been discussed under groundnuts.

16. *Striga (silo).*—This parasitic plant continues to receive but little attention from the people.

E. Exports of Agricultural Products.

17. *Exports.*

The principal Agricultural Products exported for the years 1932 to 1936 have been :—

	1932.		1933.		1934.		1935.		1936.	
	Quantity	Value £	Quantity	Value £	Quantity	Value £	Quantity	Value £	Quantity	Value £
Groundnuts ...	37,315 tons	391,657	67,370 tons	500,766	71,919 tons	387,345	45,110 tons	368,887	49,654 tons	427,317
Palm Kernels ...	722 „	5,550	615 „	4,199	553 „	2,712	643 „	4,223	626 „	4,858
Hides & Skins...	90,121 lbs.	816	21,202 lbs.	185	141,511 lbs.	1,978	93,181 lbs.	1,060	116,306 lbs.	1,839
Beeswax ...	41,246 „	1,254	11,095 „	272	59,826 „	1,404	63,989 „	1,541	32,573 „	909

F. Miscellaneous.

18. *Produce Inspection.*—Regular inspection of groundnuts and palm kernels was undertaken at Bathurst during the trade season.

Periodic inspection of river shipping ports for the inspection of groundnuts was undertaken by Agricultural Officers.

19. *Implemental Cultivation.*—Only two chiefs who had cattle and men in training with the Department undertook a little ploughing towards the end of 1936. There are however indications that the 1937 season will show a much wider and more active interest. In several instances the cattle sent for training have not been up to the necessary standard and they are difficult to obtain for some of the Chiefs who do not own many.

It may be necessary to loan departmental animals in some cases. Ploughmen belonging to the Chiefs have also been a difficulty, owing to their leaving the chiefs' service before their training is completed.

SECTION 11.

G. Work of the Department.

a. Work in Districts.

20. From June to August, 1936, only one European Officer was in the country and in consequence operations were severely curtailed during the rains. Two officers were resident from November to the end of the period.

21. *Ploughing.*—Supervision was given to the ploughing by the Chiefs in the Upper River Province in 1936. Later training of cattle for Chiefs was commenced in South Bank Province in preparation for the coming rains.

22. *Produce Inspection.*—One Inspector has been regularly employed in Bathurst during the trade season inspecting groundnuts and palm kernels. By instruction and propaganda efforts were made to improve the quality of the palm kernels and several tours in producing areas were undertaken.

Demonstrations were given in several places on the clarification of beeswax by simple methods adapted to local conditions in an endeavour to get the people to market their produce in a clean state.

23. *Hides and Skins.*—Mr. L. H. Saunders undertook the training of butchers and members of the staff in the proper flaying and drying of hides.

24. *Utilization of Refuse.*—Demonstrations at the departmental centres at Bulok, Doniajoe, Basse and Yoroberi-kunda have been given in the utilization of village and farm refuse. Few villages use their refuse, the major part being burnt as crop residues are.

b. Work at Experimental Stations.

25. Only one European officer was resident during the main crop planting season and he was stationed at headquarters.

YOROBERI-KUNDA, MacCARTHY ISLAND PROVINCE.

26. *Groundnuts. Cultivation Trial.*—This was direct comparison between ploughed with close planting, unploughed with close planting and the native methods of darambo ridging and uncultivated with ordinary native spacing. The results were outstanding.

Average yield per plot.	Ploughed 1′ x 1′ Planting.	Darambo ridging 2′ x 1′ planting Native spacing.	Uncultivated 1′ x 1′.	Uncultivated 1½′ x 1½′.
lbs.	418	275	230	173

S.E. 9·44.

It was evident that the great difference between the ploughed and the other three treatments was to a large extent due to the better germination of the former. It appears that such germination is dependent on sowing immediately after cultivation and the more thorough the latter is the better the moisture conditions are. The groundnut planting season is usually during the early period of the rains when they are irregular and interspersed with much sunshine with the result that drying out often causes death where no cultivation has taken place.

Variety Trial.

Sufficient stock of Sir Charles and Castle Cary groundnuts had been raised to carry out a preliminary trial against local and other types. Castle Cary is an upright variety and Sir Charles prostrate. The local Gambian and Basse, both prostrate and Philippine Pink, upright, were the others used.

Storm water affected some plots during the season but allowances were made for this in the results. The prostrate were planted 1′ x 1′ and the upright 3′ x 3′.

Average per plot.	Sir Charles.	Gambian.	Basse.	Castle Cary.	Philippine Pink.
lbs.	42	37	38	33	27

S.E. 2·54.

Though there is no significant difference between the prostrate types, Sir Charles shows a superiority over the upright varieties at the spacings adopted, which in the field appeared to be comparative.

The Sir Charles also turned out as the heaviest nut and is very promising. Further trials will be conducted.

Selections.

Several selections for individual plants originating from the Wuli farm were grown for observation and increase.

Miscellaneous.

A fairly large area was put under groundnuts for increase and fodder.

27. *Guinea Corn and Bulrush Millet.*—Several single plant selections were grown for further selection and selfed plants were harvested.

The rows were widely spaced and Sunn Hemp utilized as an intercrop. Neither crop appeared to suffer through this interplanting, growth in both cases being good but "silo" appeared unaffected and had constantly to be removed in the grain lines.

28. *Setaria italica and Eleusine coracana.*—These introduced crops were given a sowing date and spacing trial.

Spacings at 9″ 11″ and 13″ between the rows showed no significant differences. With an interval of one month between sowings, the second sowing in mid July was a complete failure. The first (June 15th to 20th) sowing gave average yields as follows :—

Setaria italica ...	...	404	lbs.	per acre.
Eleusine coracana ...	...	723	„	„ „

A noticeable feature was that Striga (silo) was more prevalent in the Setaria. The nature of the plant makes silo control more difficult than in guinea corn, and it appears that unless manured this crop is best grown on land reasonably free from *Striga spp.* Of the two crops Setaria is likely to appeal more to the local farmer and is being grown by a few.

29. *Cotton.*—An area of approximately two acres was put under selections of Cambodia and Native cotton and throughout the season discarding of undesirable types was carried out.

Individual and bulk selections were made on length, strength, quality and quantity of lint.

Several pests and diseases were encountered chiefly leaf rolling caterpillars and stainers.

30. *Green Manures and Cover Crops.*—Pigeon pea, velvet bean, sunn hemp and horse gram were all grown for seed, soiling or ploughing in.

Sunn hemp is very rapid in growth but requires several weedings to allow it to become well established. An area of about fifteen acres was ploughed under in September.

Velvet bean shows good cover possibilities provided early weeding is carried out and appears to control weeds of cultivation better than any other cover.

31. *Miscellaneous.*—A small area of cassava was late planted owing to failure of the earlier planting. Small quantities of capsicums and W. D. N. tobacco were grown for seed. Imported yams and ginger were tried on a small scale. The yams arrived in very poor condition. They showed reasonable growth, but the season appeared to be too short for the types. Internal dry rot appeared during storage and it is possible this was present in some of the original stock.

The ginger grew under shade but the short season did not favour full development, and under storage during the extreme heat the rhizomes shrivelled severely and little planting material is available for next season.

The 1935 seedlings of shea nut raised in matting pots were planted out during the year. Owing to its root structure success with transplanting is difficult and many failed. The only method likely to prove satisfactory is to plant the seed at stake and this will be done with seed that has been ordered from Nigeria for planting throughout all districts.

The Acacia Senegal transplanted in 1936 is showing slow but satisfactory growth. The soil is thin and stony and unsuitable for food crops or groundnuts. It is intended to sow at stake a further area under this crop.

32. *Ploughing.*—The plough mainly used was the "Sutlej" which is really a heavier edition of the Meston or M. S. N. Unfortunately the shares supplied with the ploughs were renewable point types which are unsatisfactory in the average natives' hands, and in use many of these points broke off taking a small portion of the shares with them, so that it was impossible to refit new points

In the hands of a capable ploughman who was alert for stones or roots, damage was usually slight but such men definitely preferred the one piece share which was supplied with the first ploughs ordered. In practice and depending on the soil and ploughman it was found that the one piece share was capable of about twenty acres work. The renewable point shares were also supplied on orders through Commissioners. An indent has been sent for the one piece type.

A few men belonging to the Chiefs were under training during the year and they will return to their districts for ploughing during the coming rains. The ability of the local native in ploughing varies. Some learn very quickly while others only reach a moderate standard and never seem to improve. Practically all are unable to cut the initial furrow straight in relation to the plot without a guide line. From the native point of view this is probably not very important in a shapeless field with a single plough, but it is with several ploughs at work in a rectangular plot.

33. *Manures.*—In the dry season three forms of manure making were tried (a) composting with vegetative matter only (b) composting with cattle bedding, grass and farm refuse, and (c) by accumulation of bedding in the cattle kraal over a period before removal and treatment.

With the vegetative method the important medium was groundnut grass and in view of stock requirements only a small quantity was tried. Alternate layers of grass and groundnut grass were used, the latter being only quarter the volume of the former. Each layer was thoroughly watered. The heap was built to 3′ high. Watering was carried out at weekly intervals and the heap turned three times at intervals of about a fortnight. At the end of three months a good deal of the vegetative structure had broken down. In the second method the cattle kraal was bedded with grass and removed approximately after one week and incorporated with four times its volume of dry grass and farm refuse. This received similar treatment to the first method but it broke down much more rapidly and only the edges and top of the heap showed any real amount of undigested vegetative matter. With the third method bedding was added to the kraal when the previous layer was tramped down and broken up. This was continued until the finely broken up bedding was about 9″ thick. This was then removed and heaped and watered until wet. No turning was carried out and two months sufficed to bring this into a well rotted fine condition and it appeared infinitely superior to the other forms. It would appear that where cattle are available in good numbers the most economical method of making manure would be to allow all grass and crop residue to be used as bedding and to allow it to accumulate over a reasonable period so that the urine is collected by the bottom layers and protected from evaporation by the loose dry surface. The first method is suitable for places where cattle manure is not available. The second is probably best for the rains and where the cattle are insufficient in number fully to utilize within the limited period all the farm and other vegetation that can be collected as in method three. To obtain full value it is necessary with frequent removal of bedding also to take the urine soaked soil, and as this has to, or should, be replaced a good deal of extra transport is required.

With the third method during the dry season less of the urine passes into the soil and removal of the latter is less frequently necessary.

Watering in composting is expensive in labour where only limited well water is available. At the irrigation area at Sankuli-kunda far removed from field crops and village areas it was only possible to attempt the making of humus by accumulating all green matter available. In this case decomposition was extremely slow but quite useful material was available after six months.

A primitive method of the people in the rice fields is to collect all weeds which are usually very numerous and bulky, into heaps when weeding the rice and when the next season comes round the rotted heaps are scattered and incorporated with the first cultivation.

34. *Training of Staff.*—During the year probationers and a few students desirous of employment in agriculture were given lectures in elementary agriculture and practical training. The practical side has in some cases not appealed to the students and consequently some left. Agriculture is not a collar and tie job and men to be of any value should be able to show the farmer how to do a thing not tell him only, as in explaining anything to the average farmer he frequently replies "Show me and I will try." It is unfortunate that the best material is attracted to clerical work but it is necessary to make the best of what is available.

WULI EXPERIMENTAL STATION.

35. No European officer was available for this station during the rains and work was therefore confined chiefly to growing of crops for stock and distribution. The trials of Ginger and Yams at this station resulted in much better results though the indications are that the ginger might be more successful in the more humid conditions near the coast. Cattle and men belonging to the Upper River Province Chiefs were transferred from headquarters during the year and training continued. As many native fields are far removed from water supplies the question of manure for such areas is difficult. To endeavour to meet this situation composting was attempted in pits dug by the sides of the fields. Into these all vegetative refuse from the farm and surroundings was placed, covered with a layer of soil and reliance placed on the rainfall for the necessary moisture. Except for the very coarse material, stalks of guinea corn, etc., a fair decomposition was obtained when the pits were opened up in the following dries.

CAPE ST. MARY.

36. Work at this station was confined to the raising of economic and decorative plants. The transplanted shea nut seedlings failed as at headquarters. The seed arrived from the Gold Coast too late in the season to plant direct in the field.

37. *Paddy Improvement and Dry Season Cultivation.*

SANKULI-KUNDA, MacCARTHY ISLAND PROVINCE.

Wet Season.

In addition to Guiana Creole and Hill Paddy two new introductions from Sierra Leone were grown; "Bali" a brackish water rice and "Kavunginpoothala" a deep water rice originally from India. Normally for wet season crops rice is sown broadcast just about the time the rains are expected. On this area however sowing was carried out earlier, all being completed before the end of May 1936. The seed beds were irrigated as required until transplanting was carried out. This was commenced on the 1st July and continued until the 25th August. During this period it was necessary to irrigate the transplanted rice until the first week of August when the water table covered all plots and to keep the plots clean of weeds before transplanting which is not usual with the local people. It was not practicable to transplant to set distances but, to obtain some idea of effect of spacing, several plots were planted without instruction as to spacing whereby local spacing was more or less obtained. Other plots were controlled but it was difficult to keep the men to a 6″ x 6″ spacing throughout and eventually the closest spacings worked out at roughly 8″ x 9″.

It was found that the spacing by the men themselves conformed with the general transplanting distances in the neighbouring farms. These varied from about 10″ x 12″ to 15″ x 15″.

The results of the spacings were as follows:—

15 x 15	Average	626 lb. per acre.
15 x 12	,,	723 ,, ,, ,,
12 x 12	,,	800 ,, ,, ,,
10 x 12	,,	1,140 ,, ,, ,,
9 x 9	,,	1,045 ,, ,, ,,
8 x 9	,,	1,128 ,, ,, ,,

Though the experiment was not arranged for statistical treatment the results are interesting and indicate that many of the low yields in the local rice fields may in part be due to wide spacing though much appears to be due to heavy weed infestation. Observations on the 8″ x 9″ spacing indicated that much closer planting could be adopted particularly in areas where the water was of low or medium depth.

A notable feature in the Hill Paddy plots was the more or less complete absence of damage by birds. This feature in particular has attracted the local farmer and it was noted that the fields of those who were also trying this rice were likewise free from damage. This is due to the stiff awn of this rice, and demand for this seed is heavy. Only small quantities of Bali and Kavunginpoothala seed where available and these were grown for increase. The latter showed up particularly well as a strong erect plant but it has a very long season. Though sown in May and transplanted early August it was only coming into head after the end of the rains and was harvested in January. As a deep water rice it has great possibilities, and there is no variety of rice in the Gambia with such a strong and erect growth.

38. *Dry Season.*—In past years work was mainly devoted to the problem of rice growing under irrigation but this was altered to mainly garden crops in view of the fact that in these particular swamps 6′ to 8′ above river level and because of the nature of the soil, labour was too expensive to irrigate rice in relation to returns and further because garden crops had in 1935—36 shown possibilities of better returns. Work was commenced immediately after the land was dry enough to work except where rice was to be grown. Sweet potatoes, capsicums (chillies) tobacco W. D. N. variety, shallots, onions, tomatoes, lettuce, okra and cabbage were all tried. The soil was first given a good dressing of compost and farmyard manures and ridged. With the tobacco, chilles, tomatoes, lettuce and cabbage, seedlings had previously been raised at the Yoroberi-kunda Farm and all were transplanted in December.

The sweet potatoes were planted at the beginning of January. The other crops were sown in the plots in January. It was soon noted that the soil was too heavy for most of the crops the exception being the chillies. Growth however was very good in all and gave promise of good results. These were soon dashed to the ground when it was found that many pests in the surrounding parched country concentrated in this luscious patch and in the end the okra, cabbage, onions and shallots were comparative failures. The sweet potatoes, chillies and tobacco were the outstanding crops and the results promising. Three varieties of sweet potatoes were tried and these gave yields of 2 to 3 tons per acre. The water requirements of this crop were met by irrigating once a week until March when it varied from four to five days between waterings. The tobacco (Nyasaland W. D. N.) required similar attention as regards irrigation but the closest supervision was necessary over other field operations as the labourers were unfamiliar with tobacco growing. Growth on the whole was rather slow and in April harvesting was commenced by single leaf and whole plant method. Curing was carried out in native huts, not ideal places. At first it was very difficult to get humid enough conditions, outside often showed a relative humidity of under 25 per cent. By structural alterations and other precautions more suitable conditions were attained and a fire cured tobacco was produced, which compared very favourably with that imported for local native consumption.

The capsicums,—three varieties from Nyasaland, grew remarkably well, and picking commenced in early April. At the end of May 1937 they were still bearing heavily.

Small plots of Guiana Creole rice were sown in the low lying parts and by constant correction the men eventually began to transplant automatically at about 6″ x 6″. The plots were given a dressing of farmyard manure at the rate of four tons to the acre. Growth was slower than occurs in the rains but being able to

control the depth of water it was distinctly shorter and more rigid. The crop was harvested early in May and the average yield was equal to 2,571 lbs. per acre a much higher figure than that of the wet season crop. Several Chiefs and headmen paid visits to the irrigation area during the season and the potatoes and tobacco impressed them. Women were interested in the rice and chillies.

DONIAJOE, NORTH BANK PROVINCE.

39. Funds and labour difficulties curtailed the work at this station. In the dry season sowings of rice in October and November were destroyed by Froghopper but December sowings escaped and yields from the plots averaged 1,800 lbs. per acre.

Early in 1937 the local people were approached about taking up some of the plots and working them under instruction from the department.

The women readily adopted the plan and commenced work in April. There was a general disappointment that more terraced land was not available as it enables them to get a crop established and still crop other ground under their own methods when the rains break. The Seyfu of the Lower Niumi District has asked for assistance next dries in laying out another valley some distance from Doniajoe and help has been promised.

BULOK, SOUTH BANK PROVINCE.

40. Mr. J. Pirie, Agricultural Superintendent reports as follows :—

Rainfed Crop.

The area was contour terraced, bunded and levelled during the 1936 dry season and the variety Selected Guiana Creole sown, in seed beds, from 1st April, three fortnightly sowings being made.

The yield, 2,000 lbs. paddy per acre, in comparison with adjacent village cultivations on unterraced slopes was outstandingly good and harvesting was completed six weeks before the earliest of the village crops were ripe.

Irrigated Crop.

The dry season crop suffered considerable damage from village cattle and pigs. Control was difficult and most damage occurred during moonlight nights. The villagers having no crops to guard did not herd or tie up their animals at night and they naturally grazed on the most succulent food in the vicinity. The Seyfu has now fenced in the demonstration area.

Sowings of Selected Guiana Creole were made during October and November but were destroyed by a Froghopper which appears at the end of the rains ; December sowings escaped. The pest gradually disappears as wild grasses become dry.

The dry season stand, probably as a result of the longer period available for manuring and cultivation generally, was superior to the rainfed crop.

In view of the fact that later sowings miss the Froghopper season and that in seasons of light rainfall the higher levels might become too dry for swamp paddies to mature properly a short seasons, good yielding Hill Paddy was tried. Unfortunately the entire area under this variety was eaten to the ground in one night by cattle and the remains had to be dug in.

Compost Pits.

Nutrition is the controlling factor in the production of two crops per annum and compost pits are now providing sufficient material to maintain soil fertility. Owing to the impoverished condition of the soil when the area was taken in hand unduly large quantities of material have been necessary but as soil fertility improves it will probably be possible to obtain an adequate supply from farm debris.

Extension Work.

It is pleasing to be able to report that the local people, after only one year, are taking an interest in what, to them, are revolutionary methods of cultivation and are taking active steps to copy the methods demonstrated.

The Seyfu of the District, Foni Brefet, asked for assistance in laying out an area similar to that being cultivated by the Agricultural Department. Men from various villages throughout the District came in and, under the supervision of the agricultural officer contour terraced, bunded and levelled an area of about two acres; a larger area would have been laid out but the people had to start clearing their farms for rain-fed, dry land crops. The area has been handed over to the people of Bulok, a small village and the production of two crops both superior to the one previously raised should make a considerable difference in the well being of the people.

The Seyfu is very anxious to start similar work in other parts of his District early next dries and two valleys have been selected, one near N'Demban and one near Somita. As there is no Rest House near the latter place the people offered to build one for the convenience of the European agricultural officer.

The necessary help has been promised, the scheme being that the people from throughout the District assemble to lay out as large an area as possible under the supervision of a European officer of the Agricultural Department the prepared land to be handed over to the people of the nearest village. It is the intention of the Seyfu to increase the area year by year.

BASSE, UPPER RIVER PROVINCE.

41. Mr. L. H. Saunders, Agricultural Superintendent reports as follows :—

Dry Season Cultivation.

General. A small demonstration area under irrigation was planted at Basse. The object of the planting was to demonstrate the practicability of Dry Season Cultivation. A few secondary crops were planted to show the range of plants that could be grown under the conditons. Chillies, okra, rice, tobacco, tomatoes and desert wheat were planted.

Chillies. The imported varieties 'Nyasaland Red', 'Large Cherry', 'Maules Red Hot', 'Red Chili', 'Long Red Cayenne' and 'Tabasco' were successfully grown. The plants made good growth and produced an abundance of hot peppers. The greater portion of the crop was stolen.

Okra. Small plantings of dwarf white and green pod varieties were planted and successfully grown. All the pods were stolen as they matured.

Rice. Two varieties were sown. 'Upland' and 'Guiana Creole'. The 'Upland' variety did not germinate. Nine plots of Guiana Creole were planted and a practical experiment was undertaken to show the value of Town and Market refuse.

(*a*) *Market Refuse.* This refuse included market sweepings, bone, blood and offal from the butchers pits. One plot was dressed with a 3" dressing prior to planting. The plants showed good growth and a yield of 2,563 lbs. per acre was obtained from a plot measuring 29' x 29'.

(*b*) *Town Refuse.* Four plots were dressed with town sweepings and refuse. These sweepings included grass, paper, groundnut refuse, etc. These plots measuring 43' x 46', 19' x 29', 28' x 30', and 23' x 28' gave yields of 2,036 lbs., 2,095 lbs., 1,477 lbs., and 1,153 lbs., respectively, per acre. An average yield of 1,691 lbs. per acre.

(*c*) *Control Plots.* Four control plots treated in the same manner as the other plots except that no refuse was given yielded 972 lbs., 722 lbs., 387 lbs. and 333 lbs. per acre. The high yield of the first two plots is due to their being dressed with town and market refuse the previous season. An average yield of 603 lbs. per acre.

Tobacco. The varieties W. D. N. and Hausa flowering were planted. Both varieties made good growth and produce a quantity of seed and leaves. The Hausa flowering variety was introduced from Nigeria and is grown principally for the flowers which are chewed in the fresh state by the Fulani women.

Tomatoes. The varieties 'Beauty', a wilt resistant variety, and 'Marglobe', an American variety, were planted and grown successfully. Most of the fruit was stolen from the plots.

'Alkama' Wheat. Nine plots of this Nigerian desert wheat were planted. One plot gave a yield of 718 lbs. grain per acre. The other plots produced only a small quantity of grain. The principal cause of failure of the crop was the underground filtration of water from the main water supply channel, causing waterlogging of the plots. The success of the one plot is encouraging and further plantings will be undertaken.

DISTRIBUTION OF PLANTS AND SEEDS.

42. The following were distributed from the various Agricultural Stations.

(*a*) Economic Fruit Trees.

Citrus spp.	439
Mangoes	102
Avocado Pears	59
Various	151

(*b*)

Decorative plants various	1,702

(*c*) Food Crops.

Selected Rices	4,286 lbs.
Guinea Corn	901½ „
Maize	1,369 „
Groundnuts	107 bushels
Sweet Potato Slips	1,000
Cassava Sticks	1,500

SECTION III.

(*a*) *Financial.*

34. *Departmental Expenditure.*—Departmental expenditure for the year 1936 was as follows :—

		£	s.	d.
1—8.	Personal Emoluments	2,554	13	9
9.	Sea Passages	186	3	3
10	Transport Allowances	82	5	5
11.	Travelling Allowances	28	10	7
12.	Transport	302	1	7
13.	Sundries	54	1	2
14	Scientific Apparatus	1	18	6
15.	Plants, Seeds, etc.	17	4	0
16.	Labour	994	16	3
17.	Technical Library	1	7	2
18.	Tools, Implements, etc. ...	81	15	8
19.	Upkeep, etc., Botanical Gardens ...	36	4	0
20.	Irrigation	130	1	5
21.	Purchase of Cattle	15	18	0
	Total...£	4,487	0	9

44. *Receipts.*—The receipts from sale of Agricultural Produce for the year 1936 were :

	£	s.	d.
Sale of Economic and Decorative Plants.	8	11	4
Sale of Seed of Economic Crops.	20	1	6
	£28	12	10

45. *Staff Changes.*—The principal Staff Changes during the period under review were as follows :—

Mr. F. W. Hall, Senior Agricultural Superintendent returned to the Colony on 6th August, 1936, and resumed duties of office.

Mr. J. Pirie, Agricultural Superintendent, proceeded on leave on 5th June, 1936, and returned to the Colony on 8th November, 1936.

Mr. L. H. Saunders, Agricultural Superintendent, proceeded on leave on 12th December, 1936, and returned to the Colony on 27th May, 1937.

Mr. G. D. Edwards, 3rd Grade Agricultural Overseer was put in charge of Wuli Station for the period during which Mr. L. H. Saunders, Agricultural Superintendent, was away on leave of absence.

Mr. H. E. John, 3rd Grade Agricultural Storekeeper retired from Government service on 16th November, 1936, owing to grounds of ill-health.

Promotions to 3rd Grade Overseers of Messrs. K. B. Jarmeh and M. B. Jagne which took effect as from 1st November, 1936, were made during the period under review.

Mr. Robert Lloyd was appointed Probationer Agricultural Assistant on 1st April, 1937.

46. *Staff of the Department of Agriculture.*

Senior Agricultural Superintendent.	F. W. Hall.
Agricultural Superintendents ...	J. Pirie, M.M. and L. H. Saunders.
Clerk	R. C. Camara.
3rd Grade Overseers ...	G. D. Edwards, S. Dibba, J. Touray, K. B. Jarmeh and M. B. Jagne.
Probationer Agricultural Assistants.	M. Faal, S. T. Rendall, J. E. Mungo-Lusack, J. Lloyd and Robert Lloyd.

SECTION IV.

47. *Summary of Legislative Changes.*—No legislation was enacted during the period under review.

F. W. HALL,
Senior Agricultural Superintendent.

24th August, 1937.